June 24, 1952 H. L. GORDON 2,601,276

WIRE CONNECTOR

Filed June 30, 1947 2 SHEETS—SHEET 1

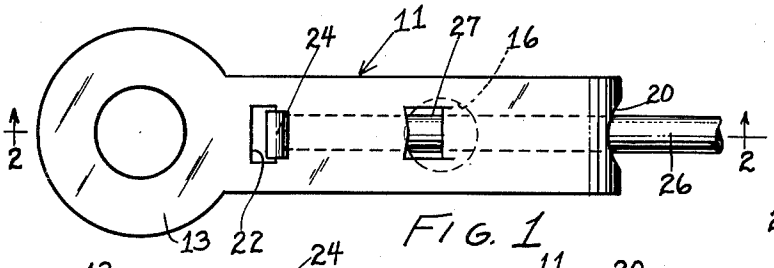


FIG. 1

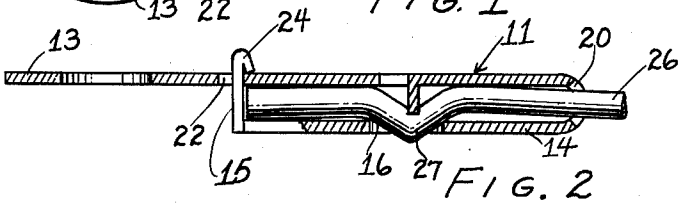


FIG. 2

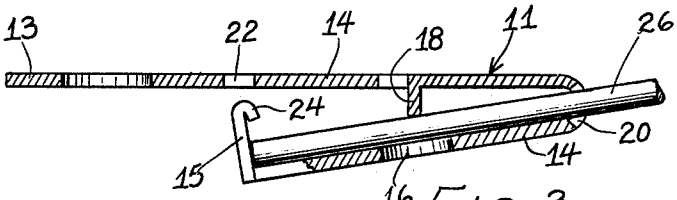


FIG. 3

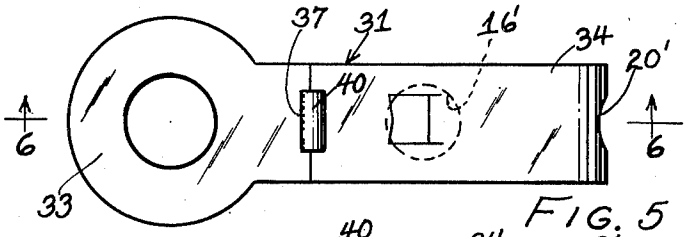


FIG. 5

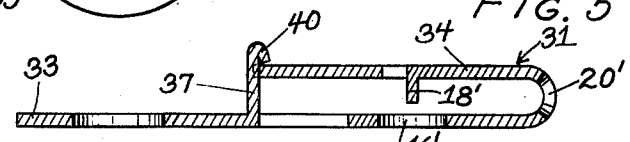


FIG. 6

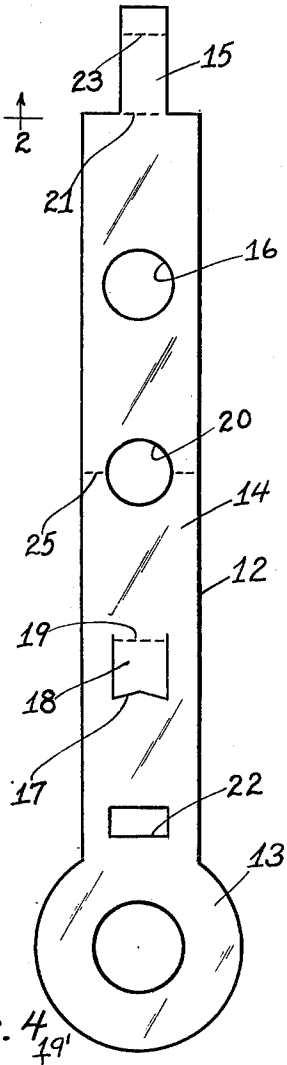


FIG. 4

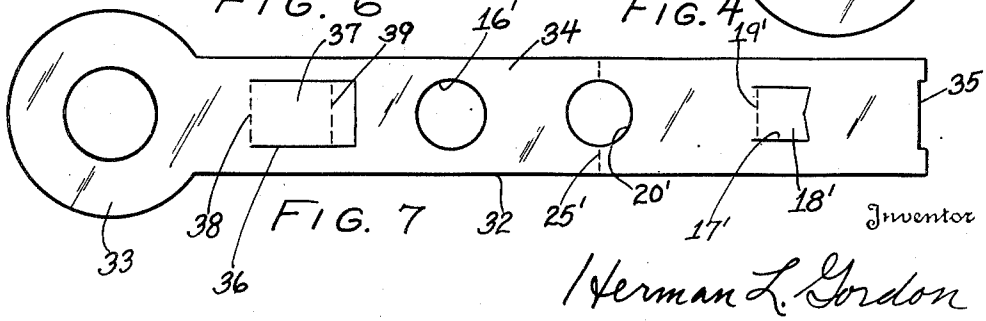


FIG. 7

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June 24, 1952 H. L. GORDON 2,601,276

WIRE CONNECTOR

Filed June 30, 1947 2 SHEETS—SHEET 2

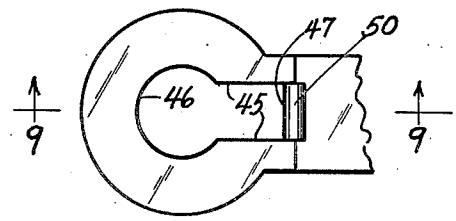


FIG. 8

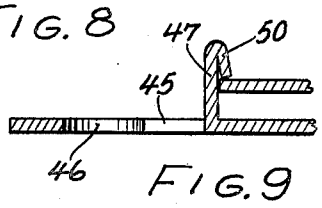


FIG. 9

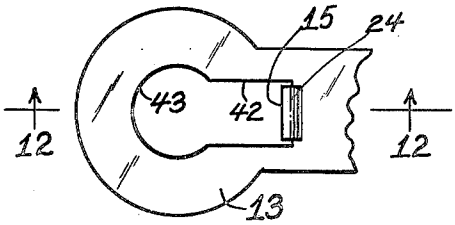


FIG. 11

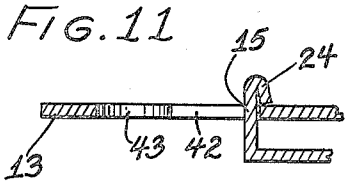


FIG. 12

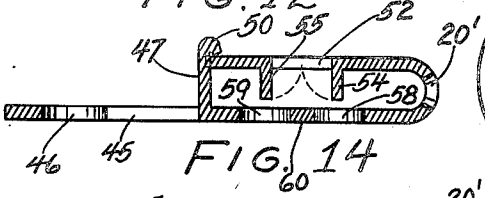


FIG. 14

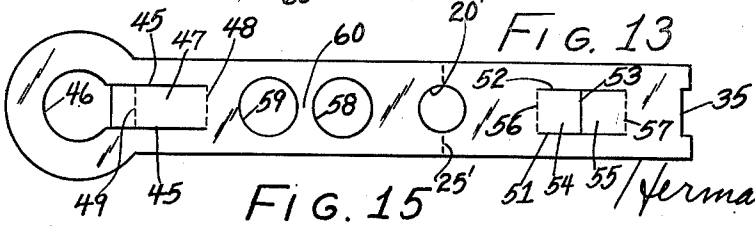


FIG. 15

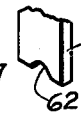


FIG. 17

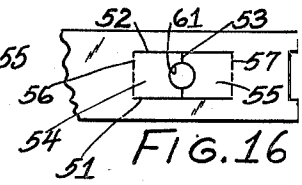


FIG. 16

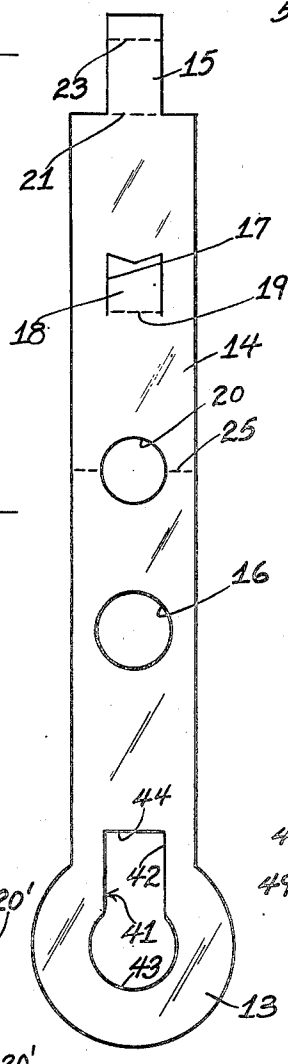


FIG. 13

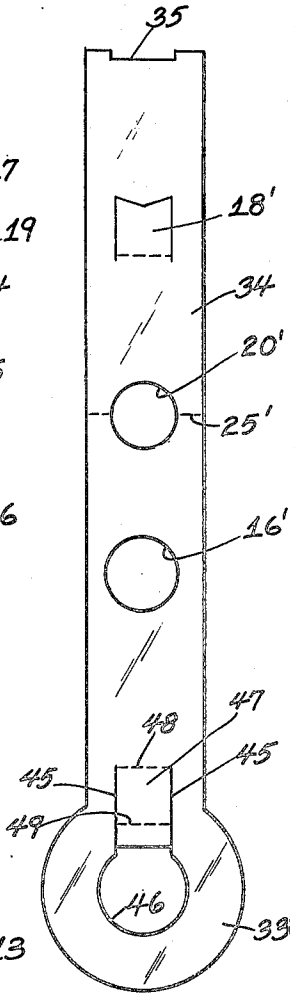


FIG. 10

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Patented June 24, 1952

2,601,276

UNITED STATES PATENT OFFICE

2,601,276

WIRE CONNECTOR

Herman L. Gordon, Silver Spring, Md.

Application June 30, 1947, Serial No. 757,999

25 Claims. (Cl. 287—82)

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This invention relates to terminal lugs for wire ends, and more particularly to terminal lugs of the solderless type.

A main object of the invention is to provide a novel and improved terminal lug which is very simple in structure, easy to secure to a wire end, and which provides a positive electrical connection to said wire end.

A further object of the invention is to provide an improved solderless terminal for wire ends which is inexpensive to manufacture, easy to manipulate and rugged in construction.

A further object of the invention is to provide an improved wire terminal of the solderless type which may be quickly applied to the end of a wire and which requires no special crimping tool to effect the desired connection of the terminal to the wire.

A still further object of the invention is to provide an improved blank for forming a solderless wire terminal, said blank being inexpensive to produce and requiring only a small amount of material.

A still further object of the invention is to provide an improved solderless terminal lug which is adapted to be readily secured to a wire end by the use of ordinary manual pressure and which requires no tools for the fastening thereof.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a top plan view of a terminal lug constructed according to the present invention, showing a wire end secured thereto.

Figure 2 is a longitudinal vertical cross-sectional view taken through the terminal lug on line 2—2 of Figure 1.

Figure 3 is a cross-sectional view similar to Figure 2 but showing the position of the terminal lug elements immediately prior to the locking operation for securing the wire end thereto.

Figure 4 is a plan view of a blank employed to form the terminal lug of Figure 1.

Figure 5 is a top plan view of a modified form of the terminal lug of the present invention.

Figure 6 is a longitudinal vertical cross-sectional view taken through the terminal lug of Figure 5 on the line 6—6 thereof.

Figure 7 is a plan view of a blank employed to form the terminal lug of Figure 5.

Figure 8 is a fragmentary plan view of the forward end portion of a further modified form of the terminal lug of the present invention.

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Figure 9 is a longitudinal vertical cross-sectional view taken through the terminal lug structure of Figure 8 on the line 9—9 thereof.

Figure 10 is a plan view of a blank employed to form the terminal lug of Figure 8.

Figure 11 is a plan view similar to Figure 8 but illustrating a still further modified form of the present invention.

Figure 12 is a vertical longitudinal cross-sectional view taken through the terminal lug structure of Figure 11 on the line 12—12 thereof.

Figure 13 is a plan view of a blank employed to form the terminal lug of Figure 11.

Figure 14 is a vertical longitudinal cross-sectional view illustrating a still further form of the present invention.

Figure 15 is a plan view of the blank employed to form the terminal lug of Figure 14.

Figure 16 is a fragmentary plan view showing a modification of a portion of the blank of Figure 15.

Figure 17 is a fragmentary enlarged perspective view of a wire gripping tongue resulting from the modification shown in Figure 16.

Referring to the drawings, and more particularly to Figures 1 to 4, 11 designates generally a terminal lug constructed in accordance with the present invention, said terminal lug being formed from a single flat blank such as shown in Figure 4 at 12. The blank 12, which is formed preferably from resilient strip material, comprises a generally annular head portion 13 and a straight body portion 14, terminating in a straight tab 15 substantially reduced in width as compared with the width of body portion 14. Body portion 14 is formed with an aperture 16 and is slit at 17 to define a tongue 18. Midway between the bending line 19 of said tongue and aperture 16 is formed another aperture 20. Spaced the same distance as the bending line 21 of tab 15 from aperture 20 but on the opposite side thereof, body portion 14 is formed with a rectangular slot 22, said slot being located adjacent the annular head portion 13 at the end of said body portion.

In preparing the terminal lug for use, tongue 18 is bent on line 19 so that it extends at right angles to body portion 14. End tab 15 is bent on line 21 to a right angular position in the same manner and the top portion of tab 15 is bent around line 23 to define a hook 24. The body portion 14 is then bent on a transverse

line 25 extending through the center of aperture 20 until the terminal lug assumes the configuration shown in Figure 3. The terminal lug is now ready for use.

In connecting the terminal lug to a wire end, the wire end, shown at 26, is thrust through the aperture 20 at the bend 25 and moved inwardly until it abuts the upstanding end tab 15. In this position, the intermediate portion of the wire end underlies the bottom edge of the depending tongue 18 and is located between said bottom edge and the adjacent aperture 16. Pressure is then exerted on the top and bottom arms of the bent body portion of the terminal lug to squeeze said arms together toward substantially parallel positions, as shown in Figure 2. The squeezing pressure thus applied causes tongue 18 to distort the intermediate portion of the wire end downwardly into aperture 16 and causes hook 24 to move upwardly through slot 22 and catch on the top surface of the upper arm of the terminal lug body portion, thereby locking the arms thereof in substantially parallel positions with the wire end 26 secured firmly therebetween by the engagement of the depending tongue 18 with the downwardly crimped bend, shown at 27, in the wire end 26, said bend being jammed into the opening 16. The wire end 26 is thus tightly secured to the terminal lug and is thereby mechanically and electrically bonded thereto.

In Figures 5, 6 and 7 a modified form of terminal lug according to this invention is disclosed, the terminal lug being indicated generally at 31. The terminal lug 31 is formed from a single flat blank such as shown in Figure 7 at 32, formed from resilient strip metal or the like, which comprises a generally annular head portion 33 and a straight body portion 34, the end of said body portion being formed with a shallow notch 35. Body portion 34 is formed with the aperture 20', is slit at 17' to define a tongue 18' and is formed with an aperture 16' spaced the same distance away from aperture 20' as the bend line 19' of tongue 18', similarly to the body portion of the blank shown in Figure 4. Body portion 34 is further slit at 36 to define a tab 37, the bend line 38 of said tab being substantially the same distance from aperture 20' as the notch 35 in the end of the blank.

In preparing the terminal lug for use, tongue 18' is bent on line 19' so that it extends at right angles to body portion 34. Tab 37 is bent on line 38 to a right angular position in the same manner, and the top portion of tab 37 is bent around line 39 to define a hook 40. The body portion 34 is then bent on a transverse line 25' extending through the center of aperture 20' until the terminal lug assumes a configuration corresponding to the angled position of the terminal lug of Figure 3. The wire end may now be inserted through opening 20' in the same manner as in the previously described embodiment of the invention and locked to the terminal lug by squeezing the upper and lower arms together until the hook 40 catches on the top surface of the upper arm of the bent body portion as shown in Figure 6. The tab 37 slidably fits into the notch 35 to thereby prevent skewing of the top arm of said bent body portion with respect to the bottom arm thereof during the squeezing operation. The tongue 18' crimps the wire end downwardly into the opening 16' in the same manner as described in connection with the previous embodiment of the invention.

In the embodiment of the invention illustrated in Figures 8, 9 and 10, the blank is generally similar to that of Figure 7 except that the blank is slit at 45, 45, the slits extending to the aperture 46 in the annular head portion 33 of the blank. A tongue 47 is thus defined which is bent to a right angled position on the line 48 and is further bent around the line 49 to define a hook 50. Hooked tongue 50 cooperates with the end notch 35 to lock the terminal lug in wire clamping position in the same manner as described in connection with the embodiment of Figures 5, 6 and 7.

In the embodiment of the invention illustrated in Figures 11, 12 and 13 the blank is generally similar to that of Figure 4 except that the locking aperture adjacent the annular head of the terminal lug blank is merged with the head aperture, as shown at 41, the resulting aperture being generally of keyhole shape and including a rectangular rear portion 42 and a circular front portion 43. The transverse edge 44 of said rectangular rear aperture portion cooperates with the hooked locking tab 15 to lock the terminal lug in wire clamping position in the same manner as described in connection with the embodiment of Figures 1 to 4.

The locations of the wire clamping tongue and aperture elements of the terminal lugs may be transposed with respect to the wire receiving aperture 20 or 20'. For example, as shown in the blank of Figure 13, the tongue 18 is located on the same side of the bend line 25 as the locking tab 15, whereas in the blank of Figure 4, the tongue 18 is located on the same side of bend 25 as the locking slot 22. The transposition of these wire clamping elements does not change the net result obtained, and such transpositions are contemplated within the spirit of the present invention.

A still further embodiment of the present invention is disclosed in Figures 14 and 15 wherein the terminal lug may be formed by using a blank similar to any of the blanks employed in the previously described forms of the invention, for example, similar to the blank employed in the embodiment of Figures 8, 9 and 10, having the hooked locking tongue 47 cooperating with the end notch 35 to lock the terminal lug in wire clamping position. Instead of employing a single wire gripping tongue as in the previous embodiments of the invention, two depending wire gripping tongues are provided, as for example, by slitting the blank at 51, 52 and 53 to define two tongues 54 and 55, which are bent respectively around the fold lines 56 and 57 to right angled positions with respect to the plane of the blank. The body of the blank is formed with two apertures 58 and 59 formed to underly the respective projecting tongues 54 and 55 when the blank is bent around the fold line 25' to the position shown in Figure 14. In securing a wire end to the terminal lug of Figures 14 and 15, the wire end is inserted through the opening 20' and is crimped by the depending tongues 54 and 55 into the respective openings 58 and 59 and is locked to the lug by the interengagement of hooked tongue 47 with end notch 35 in a manner generally similar to that described in connection with the previously described structural embodiments of the invention. The multiple tongued wire crimping action employed in the embodiment of Figures 14 and 15 provides a very tight and very strong connection of the wire end to the terminal lug due to the fact that a linear

portion of the wire end is tightly stretched over the intermediate portion 60 of the lug body between the apertures 58 and 59 therein and is clamped to said intermediate portion 60 by the depending tongues 54 and 55.

Prior to forming the slit 53 in the blank of Figure 15, the blank may be formed with an aperture 61 midway between the fold lines 56 and 57 and midway between the slits 51 and 52. This provides semi-circular notches 62 in the bottom edges of the completed depending tongues 54 and 55 which aid in centering and gripping the wire end in the terminal lug when it is locked thereto.

While certain specific embodiments of solderless terminal lugs have been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In a wire connector, a body member bent to define upper and lower arm portions, one of said arm portions being formed with an opening and the other of said arm portions being formed with a tongue directed toward said opening, and means projecting from one of said arm portions adapted to interlock with said other arm portion.

2. In a wire connector, a body member bent to define upper and lower arm portions, one of said arm portions being formed with an opening and the other of said arm portions being formed with a tongue directed toward said opening, and means projecting from one of said arm portions adapted to interlock with the other arm portion, the body member being formed with an opening substantially at the bend thereof.

3. In a wire connector, a body member bent to define two arm portions, said body member being apertured substantially at the bend thereof, the arm portions being formed with cooperating wire gripping means, and means projecting from one of said arm portions adapted to interlock with the other arm portion.

4. In a wire connector, a body member made of flat material and bent to define two arm portions, said body member being apertured substantially at the bend thereof, the arm portions being formed with cooperating tongue and socket wire gripping means and with interengaging means for locking the body member in bent position.

5. In a wire connector, a body member having a configuration defining two arm portions, said body member being apertured substantially at the junction of said two arm portions, one arm portion being formed with an opening and the other arm portion carrying a projection directed toward said opening, and means on the body member adapted to interlock with an arm portion to retain the body member in said configuration.

6. In a wire connector, a body member having a configuration defining two arm portions, said body member being apertured substantially at the junction of said two arm portions, one arm portion being formed with an opening and the other arm portion carrying a projection directed toward said opening, and a projection on the body member adapted to interlock with the edge of an arm portion to retain the body member in said configuration.

7. In a wire connector, a body member having a configuration defining two arm portions, said body member being apertured substantially at the junction of said arm portions, one arm portion being formed with a plurality of openings and the other arm portion carrying a plurality of projections directed toward the respective openings, and interengaging means carried by the arm portions for locking the body member in said configuration.

8. In a wire connector, a body member bent to define two arm portions, said body member being apertured substantially at the bend thereof, one arm portion being formed with a pair of openings and the other arm portion carrying a pair of projections directed toward the respective openings, and interengaging means carried by the arm portions for locking the body member in bent position.

9. In a wire connector, a body member bent to define upper and lower arm portions, one of said arm portions being formed with an opening and the other of said arm portions carrying a projection extending toward said opening, and a hooked projection carried by the body member adapted to interlock with an arm portion thereof to retain the body member in bent position.

10. In a wire connector, a body member bent to define upper and lower arm portions, one of said arm portions being formed with an opening and the other of said arm portions carrying a projection extending toward said opening, and a hooked projection carried by the body member adapted to interlock with an edge of an arm portion thereof to retain the body member in bent position.

11. The structure of claim 10, and wherein the body member is apertured substantially at the bend thereof.

12. A blank comprising a flat elongated strip of sheet metal formed at its intermediate portion with a first aperture and with a second aperture spaced longitudinally on one side of said first aperture, said strip being slit on the other side of said first aperture to define a tongue bendable on a transverse line spaced substantially the same distance longitudinally from said first aperture as said second aperture.

13. A blank comprising a flat elongated strip of sheet metal formed at its intermediate portion with a first aperture and with a second aperture spaced longitudinally on one side of said first aperture, said strip being slit on the other side of said first aperture to define a tongue bendable on a transverse line spaced substantially the same distance longitudinally from said first aperture as said second aperture, and being further slit to define a second tongue bendable on a transverse line spaced substantially the same distance longitudinally from said first aperture as the end edge of the strip on the opposite side of said first aperture.

14. A blank comprising a flat enlongated strip of sheet metal formed at its intermediate portion with a first aperture and with a second aperture spaced longitudinally on one side of said first aperture, said strip being slit on the other side of said first aperture to define a tongue bendable on a transverse line spaced substantially the same distance longitudinally from said first aperture as said second aperture, and being further formed to define a second tongue bendable on a transverse line spaced longitudinally from said first aperture a further distance than either said second aperture or said first-mentioned transverse line.

15. A blank comprising a flat elongated strip of sheet metal formed at its intermediate portion with a first aperture, and with a pair of longitudinally spaced additional apertures on one side of said first aperture, said strip being formed on the other side of said first aperture to define a pair of longitudinally spaced tongues bendable on transverse lines respectively spaced longitudinally from said first aperture substantially the same distances as said pair of respective additional apertures.

16. The structure of claim 15, and wherein the strip is further formed to define a third tongue bendable on a transverse line more remote from said first aperture than either said previously mentioned transverse lines or said additional apertures.

17. In a wire connector, a body member bent to define two arm portions connected together at the rear of the body member, cooperating wire gripping means on said arm portions, and means projecting from one of said arm portions adapted to interlock with the other arm portion at a point spaced forwardly of the wire gripping means.

18. In a wire connector, a body member comprising two movably connected arm portions, one arm portion being formed with an opening and the other arm portion carrying a projection directed toward said opening, and means on the body member adapted to interlock with one arm portion to restrain both arm portions against separation.

19. The structure of claim 18, and wherein the body member is formed with an aperture opening into the space between said arm portions.

20. In a wire connector, a body member comprising two movably connected arm portions, one arm portion being formed with a plurality of longitudinally spaced openings and the other arm portion carrying a plurality of projections directed respectively toward said openings, and interlocking means carried by the arm portions to restrain said arm portions against separation.

21. In a wire connector, a body member bent to define upper and lower arm portions, one of said arm portions being formed with an opening and the other of said arm portions being formed with a tongue directed toward said opening, the plane of the tongue being parallel to the bending axis of said body member, and means projecting from one of said arm portions adapted to interlock with said other arm portion.

22. In a wire connector, a body member bent to define upper and lower arm portions, one of said arm portions being formed with an opening and the other of said arm portions being formed with a tongue directed toward said opening, the plane of the tongue being parallel to the bending axis of said body member, and means projecting from one of said arm portions adapted to interlock with the other arm portion, the body member being formed with an opening substantially at the bend thereof.

23. In a wire connector, a body member bent to define upper and lower arm portions, one of said arm portions being formed with an opening and the other of said arm portions carrying a flat projection lying in a plane parallel to the bending axis of said body member and extending toward said opening, and a hooked projection carried by the body member adapted to interlock with an arm portion thereof to retain the body member in bent position.

24. In a wire connector, a body member bent to define upper and lower arm portions, one of said arm portions being formed with an opening and the other of said arm portions being provided with a flat projection lying in a plane parallel to the bending axis of said body member and extending toward said opening, and a hooked projection carried by the body member adapted to interlock with an edge of an arm portion thereof to retain the body member in bent position.

25. The structure of claim 24, and wherein the body member is apertured substantially at the bend thereof.

HERMAN L. GORDON.

REFERENCES CITED

The following references are of record in the file of this patent:

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